California GARDEN

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SEPTEMBER
1938

Sand Culture
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Problems of the Soil
R. R. McLean

for Insects and Disease

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Sand Culture . . . . .

By R. M. HETTERLY, Livingston, N. J.

If you're one of those progressive gardeners ever on the lookout for new ideas, the announcement that amateur gardeners can now grow plants in water as well as in soil has already aroused your interest. There's really nothing new in this principle. All plants grow in water. In the soil the water is in thin films, continuous around the soil particles and roots of growing plants, absorbed with nutrients from the soil through the root hairs of the growing plant. In water culture these nutrients are in the chemical solution in which the plant is raised.

As long ago as 1859 a German named Knop experimented with growing plants in culture solutions. Since then different scientists interested in Horticulture have used chemical solutions, primarily for laboratory work, to discern the influence of different amounts or deficiencies of the essential nutrients on plant growth, flower, or fruit production. And now in 1938 work has progressed so far that nutrient solutions most conducive to optimum growth and bloom are available to amateurs for stimulation of vigorous plants in their own homes.

Due to widespread publicity given to the work of Dr. Gericke in California with his tanks and chemical solutions, "Water Culture" or "Solution Culture" is a term familiar to most growers. In this practice the plants, supported over a tank by fine mesh screening or excelsior, absorb nutrients from the solution in the tank, and have air supplied artificially. Plants having a high sugar, water, and starch content benefit most from this system.

In the east, studies have also been made in soilless agriculture and now, after twenty-five years of research, we are indebted to Dr. John W. Shive and his associate, Dr. W. R. Robbins, of the New Jersey Agricultural Experiment Station for the development of the proper nutrient solutions to use in Sand Culture and the adaptation of this process to the facilities of the amateur.

Sand Culture is essentially Solution or Water Culture in sand, employing the same type of nutrient solutions. If the production of good plants is the primary objective, the sand culture method offers certain important advantages over the solution culture method: sand supplies a solid and effective support for the plant, eliminating the tanks and screens; and the sand supplies a very efficient aerating system for the roots, whereas air must be introduced artificially in solution culture. Thus Sand Culture is at once the most simple and most inexpensive method yet devised for growing plants in chemical solutions.

This method has reached such a point of practicality that it is now generally available for the growth of house plants as well as for greenhouse purposes, allowing control of the nutrient supply, which in a large measure makes it possible to control the type and quality of plant desired for house, greenhouse, or transplanting into the garden.

At this time of the year the production of perennial seedlings for transplanting to the garden would be the primary consideration. Here Sand Culture has been proven undeniably practical; besides a superior germination of seed and the development of larger and more efficient root systems in sand than in soil, Sand Culture promises comparative freedom from soil-borne diseases such as the damping-off fungus. More rapid growth is attained in sand, often shortening the time for the development of a good seedling by one third. Greater proficiency in removing the root systems from the seed bed without injury to the roots reduces the danger of check to growth or loss of plants in the transplanting operation.

Descriptive formulas of a large number of culture solutions for the growth of plants have been published by many investigators. No culture solution is complete unless it contains the six major elements: potassium, calcium, magnesium, nitrogen, phosphorous, and sulphur; and the trace elements—so called because they are required in minute traces only—iron, boron, manganese, and zinc. All these essential elements must be present in adequate proportions and concentrations and in aqueous solution form, since salts cannot be supplied to plants except in water solutions,

from which alone a plant can absorb its nutrient supply, whether it is growing in the soil or in a solution culture.

After years of experimental study, Dr. Shive and Dr. Robbins of the New Jersey Agricultural College advocate the following combinations of the chemicals in a formula for practical use: Monopotassium phosphate, calcium nitrate, magnesium sulphate, and ammonium sulphate furnish the "major elements"; ferrous sulphate, boric acid, manganese sulphate, and zinc sulphate supply the necessary "trace elements."

Successful plant growing is an exacting art, demanding considerable knowledge of technique and plant behavior. Plants grown in Sand Culture require conditions of light, temperature, and humidity similar to those required by plants grown in soil. The use of Sand Culture does not remove the necessity of such expert skill and knowledge, but together they show definite promise for the future.

Annuals for Fall Showing

Now is the time to be sowing those annuals you want in that bare spot or in that canyon site where nothing else will grow. Here are a few tried and tested ones:

Alyssum. Everblooming, sweet clusters for beds or edgings.

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Dahlias . . . . .

By CAROLYN LADD LUKEHART

Dahlia history commences in 1791, when Cavanilles, the director of the Botanic Garden of Madrid, Spain, described in the first volume of his ICONES the flowering of dahlia roots (not seeds) received in 1789 from Vincent Cervantes, of Mexico. It has been reported for years that some of this shipment found its way directly to England through the hands of Lady Bute, wife of the British ambassador to Spain, but it has recently been pointed out by careful historical research that dahlias first reached England in 1789 through the agencies of a lady who should be known by her correct title, the Machioness of Bute. This has litte effect on the history of the plant, however, as all these plants perished from a lack of proper understanding of their needs. They were reintroduced successfully in 1804, through the interest of Lady Holland. On the continent, the plants, both single and double varieties, flourished and in time were widely distributed from Madrid. In the garden of M. Donkelaar, director of the Botanic Garden of Louvain, some fine double forms appeared, which were the important beginnings of the double forms of dahlias of later years.

It has recently been brought out that while this importation was the introduction of the living plants to Europe, knowledge of their beauty and forms was reported as early as 1575 by Francisco Hernandez, the celebrated Protomedico of Philip II. He described them as being cultivated in Mexico, cited local names for several forms, and in addition noted their range of colors and degrees of doubling. His descriptions, however, were not published until much later.

With this information it is easy to understand how seedlings raised in Europe from the original tubers showed immediate and considerable variations, the reason being that the original roots probably represented not only the variable species but garden or natural hybrids in addition.

The Dahlia is easily grown in ordinary garden soil, and in warm districts can be left in the ground all winter if a heap of ashes or sand is placed over the tubers. It is somewhat tender, however, and it is better to lift it as soon as the plants have died down, and to store the tubers for the winter. The ideal soil is a rich, sandy loam containing sufficient humus to make it rententive of moisture.

Dahlias may be multiplied by seeds (single varieties) or by dividing the base of the old stem in April, taking care that an "eye" and a tuber or two are attached to each portion. Another way is to cut off the young shoots at their base and strike them in small pots.

SEEDS: Sow about one inch apart in shallow pans or boxes in March. The soil should be light and sandy with a mixture of leaf-mould. Place the pans on a warm shelf, and in April, pot-off either singly or round the edge of 6 inch pots. Place in a cold frame, gradually harden-off, and plant out 2 to 3 feet apart, early in June. After flowering, the young bulbs are taken up and treated as old tubers.

CUTTINGS: In February, March or even the first week in April, tubers which have been wintered in a dry place are placed in shallow boxes containing a slightly moist compost of two-thirds finely sieved loam and one-third leaf-mould and sand, which does not quite cover them and are set over a hot-bed close up to the glass (temperature 5 degrees F.) A number of strong shoots soon appear; when these are 3 to 4 inches long they are taken off and struck round the edges of 4 inch pots, filled with equal parts of sandy loam and leaf-mould. They should be watered, and again placed in the same hot-bed, and shaded from the sun. Pot-up singly as soon as the cuttings have struck (about 3 weeks) and

transfer to a cold frame. Pot-on as required, harden-off, and plant-out early in June.

In autumn the beds should be deeply dug and manured. They should be in an open, but sheltered position and should catch the morning sun, but must have a little shade in the afternoon. Damp, low-lying situations should be avoided. Dahlias will be best displayed in beds 3 feet wide with alleys between. Towards the end of May, the soil should be top-dressed with wood ashes which should then be thoroughly raked in. Four to five foot stakes are firmly fixed at planting time, 3 to 5 feet apart, according to the size of the plants, which are planted 4 inches deep so that the crown is just above the surface. After planting a good watering should be given, and soot sprinkled around. Remove all dead or straggling shoots and keep the plant trim and well staked. A surface mulch of rotted manure, 3 inches deep, will help to keep the roots cool and moist. When dahlias are intended either for exhibition or for highly developed flowers, early in July, when the plants are 18 inches high, pinch-out the top, and thin-out the stems that form after this, to six at the most and have only one bud on a shoot. Where a show of color, or flowers for picking, is required, eight or nine main stems is necessary. As the autumn approaches examine the shoots tied-up and slacken the raffia at base where necessary. When the frost turns their foliage brown or black, take up the plants and cut the roots, leaving 6 inches or so of stem attached. Hang the tubers up to dry with stem downwards for a few days, then plunge them with a little old soil still left on them into a box of ashes, fibre, chaff, or sand, in order to preserve them from damp, frost and heat.

Eleven of the most popular types of dahlias are: Decorative, Rosette, Cactus, Hybrid Cactus, Miniature Cactus, Ball Dahlia, Pompon, Single, Informal Decorative, Star, or orchid-flowered Dahlia, and Collarette. The food that has proved the most effective for Dahlias is 2-3 bone meal and 1-3 hardwood ashes.

Dividing and Replanting Bearded Iris

By The Master Gardener

After the bearded iris are through blooming, remove the fading flowers, and examine the beds to see whether or not the clumps should be divided and transplanted. As a rule, bearded iris should be divided about every three years. Plants growing in light, sandy soil will need to be divided more frequently than those growing in heavier soils.

This can be done any time after July 1—the earlier the better, as an early transplantation enables the plants to become well rooted before fall, and to set flower buds during September and October. Iris planted during this period will usually flower the following spring, but if dividing is delayed until fall, you may not obtain any blooms next season.

Do not divide too closely, for while each single shoot will make a good plant, it will not be so likely to bloom the first season if the division is too small. Allow the plants to separate naturally and then you are not apt to divide too closely.

If possible, make plantings in a new location. The soil should be prepared to a depth of at least 10 inches, but the planting should be very shallow. Deep planting means poor flowers and many times prevents bloom altogether. Plant at such a depth that when the soil has settled, the rhizome will be partly exposed. The rhizomes, of course, should be placed horizontally. The foliage should be reduced to a height of 4 or 5 inches, to reduce evaporation until the plants have become well established.

Do not use manure in iris beds, for this increases their susceptibility to disease. Like all plants, however, they require a complete balanced plant food, and when planting, thoroughly mix one teaspoon of plant food with the soil in the bottom of the hole.

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When dividing clumps, examine them carefully for borers, searching both the roots and top growth. The borer is the larva of a moth, and is aobut 1½" long. If not destroyed early in the season, it travels from the top growth down into the rhizome, where it burrows into the roots. Cut out all infested portions of roots, and destroy, together with the borers. Treat with disinfectant as described below for root rot, before replanting healthy portions of rhizomes. Where you have borer infestation, in late fall remove and burn all foliage and debris from the beds and burn to destroy any eggs which may be laid by the moths in August, September and October.

The presence of borer often leads to infection with root rot, because the injured rhizome is easy prey to the disease. The rhizome decays and has a very offensive odor. This is a rather common disease of iris, and is usually induced by poor drainage, lack of sunlight, acidity of the soil, or accumulation of decaying vegetation about the plant. If rhizomes are affteced with this disease, cut off all diseased parts and burn. Lay the healthy portions in the sun to bake. Then before replanting, treat them with some disinfectant. You may use a liquid disinfectant, such as mercuric chloride (1-1000), or a weak solution of potassium permangante; or you may dust thoroughly with a powder, such as dusting sulphur, or copper carbonate.

Vines for Special Purposes

Flowering Vines: Various bignonias, tecomas, bougainvilleas, jasmines, honeysuckles and a host of others.

For Covering Brick or Masonry: Boston and English ivy, Bignonia tweediana, creeping fig, climbing euonymous.

High Climbers: Bignonia cherere and tweediana, the bougainvilleas, wisteria, Solanum wendlandi, and the cup of gold.

Quick Growing Annuals: Gourd, Moon Vine, Morning glory, scarlet runner bean, cup and saucer vine.

Two Book Reviews . . . .

By S. S. BERRY

By J. Louis Roberts
Edited by Leonard Barron

This is a well arranged and informing handbook, which we are sure will meet with a warm welcome from all who grow or who intend to grow dahlias. The field is covered about as thoroughly as could be expected of one small book, and some phases of the subject are extensively treated which oft-times one does not find included in such a volume at all. There is an extended discourse on propagation, a detailed discussion of the perennially unsettled how, when, and why of fertiziling, and meticulous instruction in the growing of dahlias for exhibition. A very complete treatment of insect pests and diseases and their intelligent control covers many pages which will not be among the least often consulted in the book, but it is discouraging to find the insect, thrips, continually referred to as thrip. We evidently are in sad need of a single-letter English equivalent for **Psi.** Some readers will be happy to find an entire chapter devoted to instructions for building cloth-houses. It is of interest to note that the author admits his knowledge of only four varieties of dahlia which grow better in clay than in lighter soils, and none at all which grow best in sand.

By Anne Dorrance

This little treatise begins somewhat tritely, but fragrance is so pleasing a thing to read about as well as to smell, that we never put down unfinished a book having this as chief concern. This time we turn only a few pages to find ourselves rewarded, especially by the chapter on herbs, which is not only the best one in the book, but is supplemented by a valuable annotated list containing a great variety of odd and interesting items. One chapter is devoted to sweet-smelling plants for the the rock-garden. The compilation of a long list of fragrant plants, again well annotated, is very good and will be useful even though rather too many of the names suffer from mis-spelling. The concluding chapter deals with perfumes and potpurri. Certain charmingly written paragraphs, as on p. 22, should be mentioned, and in our perusal we are continually finding some reminder of the truth expressed on p. 43 that "human noses tell their stories in as many different ways as human brains!" Illustration is effected by a series of pleasant drawings, which have not, however, been selected in a way adding very greatly to the book's practical utility.

August Meeting

At the August meeting of the San Diego Floral Association, Mr. Hermon Lodge, famous dahlia grower of La Mesa, Calif., presented his subject on dahlias in the form of an informal seminar. "I learned more about dahlias than I have ever known in all my lifetime," remarked an attendant.

"Dahlias," said Mr. Lodge, "originated in Mexico about 200 years ago. The name had its origin in England, given as an honor to Andrew Dahl, a Swedish botanist, but he had nothing to do with the origination." With specimen blooms he illustrated many types, making mention of — the formal and informal decorative, having ragged petals; cactus, whose petals are folded from tip to end; semi-cactus, with petals twisted half way; lacinated, having petal ends narrowly incised. There were miniature, the pompon and orchid or star types, and many with large blooms measuring 14 to 17 inches—three outstanding varieties—Splendid. Blue River and Satan were shown. The latter does not like hot weather, he said.

Hybridize through seeds only, and pollinate by bees for best results. Dig tubers in late December leaving on plenty of dirt, then plant out the 1st of May following, 3 feet apart and about 6 inches deep. Seeds should be planted in flats during March to produce blooms in July and August. Tie to stakes, all plants producing large blooms. Irrigate once a week and always cultivate after watering. Overhead sprinkling is very advisable, and sprinkle in heat of day.

Some of the dahlia pests mentioned by Mr. Lodge are thrips which feed on the plant's juices; leaf hoppers; green spotted beetles which are chewers; grasshoppers; and cut worms which cut the base of the stalk. Keeping bantams will rid the plants of sow bugs.

Nematodes are found in almost every tuber, but when great in number, burn the tubers.

Miss Kate O. Sessions showed beautiful specimens of pink heather, and discussed floral arrangement of tuberous begonia blossoms suitable for table decoration.

The acreage of Mrs. Larson's at Encinitas was well represented with varieties of lilies.

Mrs. Mary A. Greer, president, having recently returned from an auto trip to Victoria, B.C., Canada, described many beautiful floral and horticultural settings which she had the pleasure of enjoying. The Butchart's Gardens in Victoria were in a class to which a certain representation as to beauty, etc., cannot be portrayed in words. Hanging baskets on all lamp posts in Victoria gave charming impressions. Mrs. Greer drew attention to San Diego Floral association's 32nd annual fall flower show to be held August 27th and 28th, Balboa park, and urged all who delight in growing flowers to enter displays.

—Gertrude M. Gibbs.

American plants provide a host of things for the menus of the world. Many of these plants were unknown to Europeans before they came here, although in use for centuries by earlier American civilizations, such as the Aztecs and the Mayans. Incidentally, modern men have been able to invent but few uses for corn unknown to the Aztecs and Mayans. Earliest Americans did not know about corn starch.

Lessen Thrip Damage to Gladiolus

By The Master Gardener

Much has been said and written about thrip damage to gladiolus in recent years, and damage varies with localities.

The gladiolus thrip was first discovered in American gladiolus fields about 1930, and became rapidly distributed throughout North America wherever gladioli are grown.

For the first two or three years, the thrips confined its activities largely to gladiolus and this still remains its host plant, but it now feeds and breeds on a number of other host plants of which the following are the most widely grown: Iris, hollyhock, delphinium, white clover, goldenrod, aster, narcissus, cucumber, and the dandelion and a number of other weeds.

Though there are facts to substantiate the belief that the species is capable of maintaining itself over winter in the open, provided the season is not too severe, the major part of the infestation is carried over on the corms in storage.

Where infested corms are planted, flower buds will be blasted.

Where infestation results from adjoining infected fields, and thrip-free bulbs have been planted, considerable damage to foliage may result but the flowers are seldom injured.

In some sections, where rigid control measures have been practiced, damage is now negligible, while in others, where not much has been done along this line, many gardeners have been so discouraged that they have just about given up growing glads.

If an intensive preventive and remedial program is followed, however, there is no reason why thrips cannot be almost entirely eliminated. ed. This schedule consists of:

1. Treating corms in the fall, before storing. After digging and curing corms, place in paper bags, with one ounce of napthalene flakes to each 100 corms. This forms a gas that kills the thrip and eggs. Leave several weeks but be sure corms do not sweat or mold. There is a certain amount of risk in using napthalene if the treatment is continued too long, or the corms are covered too closely during the fumigation.

   Store in a cool dry place, having a temperature of about 40 degrees, as any stray thrips that might have survived will not continue to breed at this temperature. Corms must not be allowed to freeze, however.
2. Treating corms at planting time. In the spring, just before planting, soak the corms for two or three hours in a solution of bichloride of mercury (corrosive sublimate) using one ounce of bi-chloride of mercury to 8 gallons of water; or if the bichloride of mercury is purchased in tablets, one tablet to 1 pint of water. Be sure to use stone crocks, glass jars, or wooden tubs—do not use a metal container. Thorough soaking will effectively destroy all thrips and their eggs.

   The treatment is also good to use against scab and disease.
3. Spraying after planting. Spray every week or 10 days after the plants are 6 inches high. Do not wait until the buds appear, as it is too late to save these blooms then. Effective spraying will control those thrips that have survived previous treatment or that may be carried to your plantings from nearby infestations.

   A very good spray for this purpose is:

   2 tablespoonsful of Paris green
   2 lbs. brown sugar
   3 gallons of water.

   This spray, to be most effective, must be applied as a mist, and never in sufficient quantity to cause the plant to drip. Spray on both sides with plenty of force. Keep the solution well stirred, as an overdose of Paris green will burn the foliage.

   Another spray recommended during the growing season is:

   3½ ozs lead arsenate
   4 ozs. Derris
   1 lb. glue
   10 gallons of water

   One gladiolus grower reports using a commercial dust containing 1 per cent rotenone, which, when applied before the dew was off, proved very effective and may supplant sprays during the growing season.

If the above program is followed, practically all injury from disease and thrip may be prevented. Many commercial growers who follow this program say they have never seen any thrip or thrip injury in their fields or storage.

Feeding and watering is important, too, in connection with control of thrips. A leading experiment station, in a recent bulletin, stated that where it was possible to feed the plants, and to irrigate in combination with a spray program, loss from thrips was negligible. So, in addition to the precautions outlined above, feed your gladiolus with a complete, balanced plant food. When planting glads in rows, apply 1 pint of complete plant food to each 20 feet of row, mixing thoroughly with soil before planting the corms. After spikes are 4 to 5 inches high, apply 1 pint to each 15 feet of row, applying on each side of the row and working well into the soil. Apply half this quantity when buds appear.

Bug Bait

A new chemical has been discovered that is producing wonderful results as an attractant and killing agent for slugs, snails, cockroaches etc.

This new chemical, Meta-Acetaldehyde, a European chemical product, is used as the attractant and killing agent in the new Ortho garden bait "Bug-geta."

The great power of this new bait can readily be seen by anyone who tries it; by observing the places where the bait was placed, at night with a flash light, and by noting the amount of dead pests that are near or about the places where the bait has been placed. The results will surprise the user. It has a very strong attracting and killing power.

The discovery of this new chemical is a decided stride forward in pest control and will be the means of a more satisfactory control of many night feeding pests.

Farmers Hold Fallacies About Feathered Friends

Some of the birds that save millions in crops each year are still misjudged by the farmer.

The Baltimore oriole has been accused of damaging grapes and garden peas. But Department of Agriculture studies show that the oriole's food habits are largely beneficial. Caterpillars are its favorite fare, but it also eats quantities of plant and bark lice, ants, wasps, grasshoppers, spiders and weevils.

Farmers who tear swallows' nests from barn eaves are turning out their best friends. Swallows, catching their food on the wing, consume vast numbers of harmful flying insects especially during the nesting and molting periods when they, like most other birds, eat little besides animal foods. Young birds in the nest often eat more insects than their parents. To encourage swallows, provide mud for nest mortar, a shelf to support nests, and cut small entrance holes in barn gables. Barn and tree swallows will appreciate boxes placed high in the barn, while purple martins will make good use of houses on top of a pole in an open space.

Woodpeckers are often suspected of damaging trees by their drillings. Each hole drilled means that the bird has located the larva of a destructive wood-boring insect. Woodpeckers are among the most valuable forest conservationists. With their heavy bills they get insects that other birds cannot get.

Fruit raisers often look on robins as enemies because of the robin's appetite for cherries. Yet robins consume insects harmful to fruit crops throughout the year, and only during the flocking periods in June and July do they eat cultivated fruit to any extent. As soon as the wild berries are ripe they will form the greater part of the food. One good way to keep robins out of the orchard is to plant mulberry trees nearby. Mulberries ripen at the same time as cherries and the birds prefer them to other fruits.

Problems of the Soil . . . .

By R. R. McLEAN

Question: A small patch of Johnson grass is causing me some concern since it seems to be spreading out towards my citrus trees. Please give me some information about a spray that will kill it?—Mrs. L. O.

Answer: Several materials, such as oil, chlorates, arsenicals, etc., will kill the top growth of Johnson grass when applied as a spray, but if the grass is old and deep rooted no permanent harm will be done it. There are at least two other methods which, if persisted in, kill it out, however. If the patch is not too large and the soil not too hard, the roots can be dug out by hand, although this will necessitate getting every bit of root out and means digging down several feet. The other method is to gas the weed by means of carbon bisulphide. Simply punch holes in the ground about a foot apart throughout the patch and into each pour an ounce of the chemical named. Don't make the holes over 4 to 6 inches deep else the grass may sprout above this point. Cover up each hole after the carbon has been applied in order to hold the gas in. Carbon bisulphide forms a gas heavier than air and when injected in the soil works downwards towards the roots of plants it is desired to kill. After a few months you may need to retreat a few plants that escaped the first treatment.

Question: Not long ago I got a lot of leaf mold from the mountains and set out a lot of plants in it. I now find that the beds are full of small centipedes. I don't know that they are doing any harm but I would like to get rid of them if possible. Can this be done without injuring the plants? Please tell me what to use.—Mrs. K.L.

Answer: If these small animals are in fact centipedes (strictly speaking centipedes are not insects) they will be found doing some damage to seeds, young shoots of plants and roots. They are often found in vegetable mold or in soils rich in humus. Gassing the soil with carbon bisulphide or calcium cyanide will eradicate them, but if there are plants in the same soil they will be killed also. Perhaps the best thing to do under the circumstances is to mix pyrethrum powder and ground tobacco half and half and dig this in around the plants. You may be able to get something already prepared containing tobacco, pyrethrum or derris. These materials will be effective and not harm the plants. Of course if the area to be covered is large the cost of these materials might be a little execssive.

Question: Can you tell me if there are any native maples in California? If so, what are they and where do they grow? I have seen some maples in parks here in the south but do not recollect seeing any trees wild.—Mrs. T.T.R.

Answer: There are a few native maples in California although with but one or two exceptions they are mostly found in the northern counties. One of the exceptions noted is the California box elder, this being a variety of the eastern form, and is of course a maple. Box elders can be found in the coastal mountains and valleys as far south as Santa Barbara county and in some of the San Bernardino mountains. The same is true of the broadleaf or Oregon maple, this being the only large maple of the Pacific region, according to Sudworth. It also extends through northern California into the Fresno and Tulare county mountains down to Santa Barbara county and the San Bernardino mountains. A small species known as the Vine maple is found in northern California as is also the so-called dwarf maple.

The writer does not know of any native maples in San Diego county although it is entirely possible there are some of the species mentioned in the higher elevations.

QUESTION: I am developing water which I hope will be in sufficient quantity to irrigate a grove of oranges. How many acre inches would be necessary to make it safe under such circumstances? D. O.

ANSWER: Much depends upon location, type of soil and rainfall in your locality. In some favorable locations and in years of normal rainfall 10 *or* 12 *inches plus rainfall would be sufficient for full grown, bearing trees. If the rainfall should be deficient during any year, or during a succession of years, trees having available only* 10 *or* 12 *inches of irrigation water would probably suffer, or at least fail to produce normal crops while this condition existed. In some localities full bearing trees should have available from* 18 *to* 24 *inches or even more, plus rainfall. There are plenty of exceptions, of course, as so much depends upon the factors first mentioned. It is therefore advised that for your particular location you consult your neighbors having good producing groves, or get in touch with the Farm Advisor's office in the Chamber of Commerce Building, San Diego, and request an inspection and advice based upon such survey as may be made.*

QUESTION: Will you kindly advise me if it is necessary or advisable to remove lawn trimmings when cutting the grass, or may they be allowed to lie where they fall without injury to the lawn? Mrs. J. H.

ANSWER: Most gardeners use a carrier and remove all lawn trimmings, but it appears to the writer that this is not at all necessary where the lawn is cut regularly and the grass is not allowed to become too long. Practically all of our soils lack humus, or decaying organic matter, and our lawns are no exception to the general rule. Bits of clipped grass falling on the soil are finally worked into it and increase its humus content. Of course if the grass is quite long when cut the swaths left would be rather unsightly and the surplus can then be lightly raked off with a bamboo rake. In the fall when some of our undesirable and injurious grasses, such as crab-grass and Bermuda, are seeding it is advisable to use a carrier if the lawn is contaminated with them in order to remove as much of the seed as possible.

Question: Do you know of any way to get rid of mushrooms in a lawn? One section of my lawn has a great many mushrooms in it and not only do they look badly but I am afraid they are poisonous. And by the way, where do they come from?—H.E.F.

Answer: A fungicide of some sort,, as semesan, cerosan, bi-chloride of mercury, or Bordeaux mixture, applied to the section of the lawn containing mushrooms should be quite effective, although if used sufficiently strong to kill fungi these materials may kill or injure the grass also. Arsenate of lead applied either in solution or as a top dressing should be of value in this connection also, without special injury to the lawn. This material is often used in lawns to control beetle larvae and is applied at the rate of about 3 pounds per 100 square feet if mixed with water, or 2 pounds per 100 square feet if mixed with loam and scattered. Spores (seed bodies) of mushrooms may be carried from place to place by the wind, or in dirt and in manure that is used to fertilize the lawn with. All new infestations usually start in this way.

Question: Will you kindly tell me if there is any way to suffocate or at least suppress Bermuda grass around avocado trees bordering our lawn, by using tar paper or any other material. Also, is there any practical method of keeping the water in our lily pool clear. Although we change it frequently it looks stagnant and bad. The pool holds about 100 gallons of water—H.C.

Answer: Heavy tar paper will kill out Bermuda grass but it is important that the edges or laps be sealed tight, either with tar or earth or some such material, to prevent light and air from penetrating under or through the paper. The writer has known of morning glory being completely eradicated by this method and of course Bermuda is much less persistent than morning glory. A chemical known as calcium chlorate, sold under the trade name of Atlacide, is also quite effective as a weedicide when used properly. Atlacide can be applied either in the dry powdered form or mixed with water according to directions given by the manufacturers and put on as a spray. The only care necessary in its use is to apply only the amount necessary to cover the grass well as if used in excess the soil may be harmed to some extent. One treatment may not be sufficient and if so a second can be applied. Arsenical solutions are fairly satisfactory on grass and weeds but must be used with much care because of the danger involved to animals as well as to the plants the spray may fall upon.

The use of either copper sulphate or permanganate of potash will ordinarily keep pools free from algae. To begin with a solution of chloride of lime, 1 can of the lime to 5 gallons of water, can be used to scrub the pool with; then rinse out two or three times with clear water and refill, adding ½ grain of copper sulphate by weight per gallon of water in the pool. If your lily plants cannot be moved or are in the way while cleaning out the pool, you probably will have to omit the chloride of lime treatment and depend upon clear water and the copper sulphate to keep it clear.

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How to Feed Trees . . . .

Much has been said and written of late regarding the many benefits to be derived from the feeding of trees, but, even so, many gardeners who have not heretofore been aware of the necessity of feeding their trees to preserve them and increase their beauty, do not have a clear conception of the proper method of feeding. So I list below questions that are frequently asked me about tree feeding.

1. What are the symptoms which denote lack of nourishment in the soil?

Thin, scanty, foliage with undersized leaves of poor color; tips of branches which have died back; prescence of many dead branches in the trees; and short annual twig growth, are all symptoms which denote undernourishment. Also, if your trees fall an easyl prey to every bug, blight and disease that comes along, it may be that they are suffering from malnutrition.

2. What kind of plant food shall I use?

By all means use a complete, balanced plant food. Such a plant food is immediately available to the tree and it furnishes nourishment that makes for balanced, healthy growth.

3. When is the best time to feed?

Authorities agree that in this section trees can be fed at any time during the year. If spring or summer feeding is not convenient, a good time is late fall, after trees are dormant.

4. Does feeding increase resistance to inspect and disease attacks? Also resistance to drought?

A research worker in one of our leading midwest universities says: "One of the few points in the culture of trees and shrubs upon which all authorities agree is that adequate fertilization and care will do much to eliminate repair problems. Whether trees be newly planted or old and established, this statement holds true. The vigorous, healthy tree, with its greater vitality, its increased recuperative powers, its more active growth, will be able to overcome and resist certain insect and disease attacks and be better able to heal over wounds completely before decay sets in."

Another authority, an entomologist of a leading eastern university, says: "Valuable trees should be fed proper fertilizers to keep them in vigorous condition and to prevent killing of branches in which bark beetles, that help to spread disease, may breed." Moreover, he says, strong, healthy, vigorous trees are better able to withstand infection by disease.

A publication of a prominent midwest botanical garden says: "It is well known that the undernourished tree most generally falls prey to the ever-present enemies. The declining tree cannot resist borer attacks; nor can it withstand dry weather; nor can it sacrifice any more of its few yellow leaves during a caterpillar invasion. A well-fed tree will require much less water than its starving neighbors. To the tree owner in San Diego, this last feature, always associated with feeding, is worth the expense involved and cannot be overemphasized."

5. How can I compute the amount of plant food necessary to feed any given tree?

In figuring the requirements of a tree, allow 1 pound of complete plant food to each inch of circumference of the trunk, measuring the trunk 4 feet above the ground.

6. What is the best method of application?

Since the main feeding roots of the tree extend out in a circle equivalent to the circle made by the drip of the branches, this is the proper place to apply the plant food. Make a series of holes, two inches in diameter and about 18 inches deep, under the drip of the branches, in a zigzag fashion. The holes can be made best with a ground auger but a crowbar or other pointed device can be satisfactorily used. Fill the holes half full of the complete plant food and complete filling with soil.

Not only shade trees, but the ornamental flowering types as well as fruit trees benefit greatly from feeding.

"RUSTLESS" SNAPDRAGONS REGAIN GARDEN FAVOR

Flower gardeners are renewing interest in snapdragon growing as a result of new varieties that thrive in spite of the rust disease. The rust originated—or was first observed—in California, and spread over most of the United States. It is caused by a fungus that attacks the plants and the results were so serious that many gardeners did not think it worth while to try to grow snapdragons.

In recent years the rust has appeared in England and probably will spread over Europe. Florists, too, were hard hit by the rust, but were able to keep growing "snaps" by particular attention to moisture and temperature control which limited the growth of the fungus.

Dr. S. L. Emsweller and H. A. Jones, of the United States Department of Agriculture, in 1933—while both were at the University of California—introduced a strain of snapdragons highly resistant to the rust although not first class garden flowers. Breeders on the Pacific coast and elsewhere have used this strain for its rust resistance, crossing and back-crossing it with fine flowering strains for improvement of color and flower forms while retaining rust resistance. These improved and rust-resistant varieties account for the snapdragon's return to favor.

NOW IS THE TIME TO MAKE BULB PLANTINGS

Here are a few suggestions for September planting:

Iris—all kinds but don't forget the bulbous types.

Anemones and ranunculus you will want in quantity.

Freesias—once started you will always have them and their fragrance is unsurpassed.

Galanthus (snowdrop) and Leucojum (snowflake.)

Narcissus—in variety. New types coming out all the time.

S. D. Floral Association meeting held third Tuesday of each month at Floral Bldg., Balboa Park, 7:30 p. m.

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Fall Flower Show a Decided Success

The Thirty-second annual Fall Flower Show was a decided success as regards variety, color and attendance, and proves its value for the community educationally and artistically.

The dahlias and zinnias made the largest and most colorful display of extra quality.

The exhibits of the Comstock and Raleigh dahlia gardens, commercial exhibitors, shared honors and prizes in the various groups. The private garden of J. W. Cofforth showed a very fine collection of dahlias. The many dahlia competitive displays by amateurs was the largest ever and gives proof that the dahlia is more popular and permanent a perennial for the garden. The zinnias also were generously shown and is a popular fall annual flower. The begonias were not so generously exhibited as in past years but a collection of the tuberous variety was the finest ever shown, and won for J. W. Cofforth a first and special award. The hardiness of the tuberous begonia is being better appreciated and its culture will be more popular not only for its plant decorative value but as a lasting cut flower for special arrangements.

Only three commercial displays were presented, a good rock garden by W. F. Wylie, and the nurseries of Kelly and Otto, the latter being first with a fine show of handsome lilies. Lilies are choice perennials that increase yearly and many more varieties should be in cultivation here. Lath house subjects were good, rex begonias, fibrous sorts, assorted ferns, and hanging baskets which are more varied at each show. Fuchsias as potted plants were too few, as they are such hardy potted plants. Asters, petunias, marigolds, and annuals in general were of good quality but not in quantity. A very large bunch of Arbutus unedo, the strawberry tree, was the finest ever exhibited, heavy with fruit, from the G. W. Marston gardens. This shrub is deserving of more general cultivation and its slow growth is an asset, its foliage, flower, and fruit are so excellent. The still life pictures were the best display ever, each one desrved a ribbon. There was more art in arrangement, size and variety of subject. The arrangement of flowers, fruits, and foliage in containers was certainly the most artistic and varied, and deserved generous awards. Several new exhibitors were very successful in receiving ribbons. The banquet tables were unusually choice, also the luncheon, breakfast and patio tables were original and suggestive for practical use. The display of succulents and dish gardens and trays, also cacti were interesting studies for the future. One display of six rare plants was very interesting and commendable, more such need encouraging.

The community display by Pacific Beach was a new feature and should encourage interest by other neighborhoods to make similar exhibits with their flowers and fruits.

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An ever-blooming pink heather.

A lavender flowering and strong growing vine for special location.

The Madagascar fragrant Stephanotis—white vine.

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